DOCUMENT RESUME

ED 424 852 IR 019 120

AUTHOR	Ludlow, Barbara L.; Duff, Michael C.
TITLE	Distance Education and Tomorrow's Schools. Fastback 439.
INSTITUTION	Phi Delta Kappa Educational Foundation, Bloomington, IN.
SPONS AGENCY	Phi Delta Kappa, Los Angeles. Univ. of Southern California.
ISBN	ISBN-0-87367-639-4
PUB DATE	1998-00-00
NOTE	58p.
AVAILABLE FROM	Phi Delta Kappa International, 408 North Union, P.O. Box 789, Bloomington, IN 47402-0789; Tel: 812-339-1156; Tel: 800-766-1156 (Toll-Free).
PUB TYPE	Reports - Descriptive (141)
EDRS PRICE	EDRS Price MF01 Plus Postage. PC Not Available from EDRS.
DESCRIPTORS	Continuing Education; Delivery Systems; *Distance Education; Educational Change; *Educational Technology; *Educational Trends; Elementary Secondary Education; Futures (of Society); Higher Education; Information Networks; *Information Technology; Organizations (Groups); Program Descriptions; Scholarly Journals; Teacher Education; *Telecommunications
IDENTIFIERS	Technology Integration; *Technology Utilization

ABSTRACT

This booklet provides an overview of distance education today, including discussion of exemplary programs and implications for the future. The first section defines distance education and examines trends, possibilities, and problems. Distance education technologies are discussed in the second section, including "low tech" systems (correspondence and audioconferencing), "high tech" systems (broadcast television, compressed video, computer multimedia modules, and online instruction), and technology costs. The next section addresses elementary and secondary education, including large- and small-scale applications. Postsecondary education, including higher education and adult continuing education applications, is discussed in the fourth section. The fifth section deals with preservice and inservice teacher education, followed by a section that considers implications, including the pace of change, suggestions for educators, and using distance education effectively. The final section discusses the potential of distance education to revolutionize tomorrow's schools. Contact information for relevant journals and organizations is included. (Contains 75 references.) (DLS)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED 424 852

439 FASTBACK

Distance Education and Tomorrow's Schools

Barbara L. Ludlow
Michael C. Duff

IR019120

PERMISSION TO REPRODUCE AND DISSEMINATE THIS MATERIAL IN MICROFICHE ONLY HAS BEEN GRANTED BY

D.R. Walling

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

2B

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☐ This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

PHI DELTA KAPPA EDUCATIONAL FOUNDATION

BEST COPY AVAILABLE

Barbara L. Ludlow

Michael C. Duff

Barbara L. Ludlow is a professor of special education at West Virginia University, where she coordinates the distance education graduate training programs in Severe/Multiple Disabilities and Early Intervention. She holds a master's degree in special education from the University of Delaware and an Ed.D. from West Virginia University. Her primary research interests involve development and evaluation of innovative models of teacher education. She has published a number of professional articles on topics related to technology-mediated learning and distance education to prepare special education personnel. Ludlow also is the author of four previous fastbacks: 169 *Teaching the Disabled Learner*, 213 *The School's Role in Educating Severely Handicapped Students* (with Richard Sobsey), 257 *Preschool Programs for Handicapped Children*, and 409 *Trends Shaping the Future of Special Education* (with Thomas P. Lombardi).

Michael C. Duff is an instructional television producer at West Virginia University, where he has directed and produced televised courses for distance education in undergraduate and graduate programs for nearly a decade. A veteran video professional, he has a broad background in the development and production of educational media. Duff is the co-owner of Discover Video Productions. He has made numerous presentations at national conferences on topics related to teaching with technology and distance education. He also has offered professional development workshops for the university and other organizations to prepare faculty and graduate students for instructional responsibilities and to train production personnel for technical roles in distance education.

Series Editor, Donovan R. Walling

Distance Education and Tomorrow's Schools

by
Barbara L. Ludlow
and
Michael C. Duff

ISBN 0-87367-639-4
Copyright © 1998 by the Phi Delta Kappa Educational Foundation
Bloomington, Indiana

This fastback is sponsored by the University of Southern California Chapter of Phi Delta Kappa International, which made a generous contribution toward publication costs.

The chapter sponsors this fastback to commemorate the 75th anniversary of its founding in 1922.

Table of Contents

What Is Distance Education? 7
- Trends 8
- Possibilities and Problems 9

Distance Education Technologies 11
- Low Tech 11
- High Tech 13
- Technology Costs 15

Elementary and Secondary Education 18
- Large-Scale Applications 19
- Small-Scale Applications 21

Postsecondary Education 23
- Higher Education Applications 23
- Adult Continuing Education Applications 26

Teacher Education 28
- Preservice Programs 28
- Inservice Programs 30

Implications and Suggestions 34
- The Pace of Change 36
- Suggestions for Educators 38
- Using Distance Education Effectively 40

Tomorrow's Schools 43
References 46
Resources 51

What Is Distance Education?

A simple definition of distance education is any instructional activity in which the instructor and the learner are separated by space or time (Keegan 1988). While the term "distance learning" focuses on the learner's role and the term "distance teaching" emphasizes the instructor's responsibilities, the term "distance education" emphasizes the interactions between the instructor and learner, which are at the heart of education.

Distance education can be as simple as a correspondence course that uses surface mail or as complicated as an interactive television course that combines video, audio, fax, and E-mail. When telecommunications technologies are used for these instructor-learner interactions, the process is known as *technology-mediated* distance education (Verduin and Clark 1991), because the delivery system filters both content and instruction.

Although early applications of technology for distance education typically used a single delivery mode, newer models employ several technologies to accomplish different goals within the same program. The

rapid growth of telecommunications technologies in the last decade and their increasing availability around the globe have stimulated wide-scale expansion in distance education programs.

Trends

Distance education is not a new idea. In the United States it dates from the 1700s, when correspondence courses were offered to train prospective clergymen (Rowntree 1986). Distance education has long been used in remote rural areas in such countries as Australia and Canada. Great Britain established the Open University in 1969 to provide higher education opportunities to nontraditional students, initially using correspondence courses and now moving to telecommunications delivery (Holmberg 1995). And a number of developing countries have used distance education — first correspondence study and more recently satellite broadcasts and Internet connections — to avoid the expense of building schools and colleges (Tiffin and Rajasingham 1995). Several of these countries also are exploring the use of distance education to train professional personnel, including teachers (Perraton 1993).

In the 1980s, telecommunications technology permitted real-time interactions using telephone and television; and educators began to experiment with distance education for high school and college courses and for adult and continuing education workshops (Moore 1991). In 1988 Congress established the Star Schools Program, a federal project to provide funding for educational uses of

telecommunications equipment linking colleges and schools (Moore and Kearsley 1996). About the same time, the Annenberg Foundation and the Corporation for Public Broadcasting joined forces to offer funds to colleges and universities to incorporate technology into their delivery systems (Moore and Kearsley 1996).

The continuing development of digital technologies is stimulating the growth of "third generation" delivery systems that combine media to take advantage of their relative strengths (Nipper 1989). The success of these efforts is encouraging more and more educators to consider the possibilities of distance education.

Distance education suits current education theories that focus on learning as a self-directed, active, and collaborative process and view the instructor as a facilitator or guide, rather than a transmitter of knowledge. Distance education provides both instructors and learners with powerful tools for locating, synthesizing, and creating resources in digital "schools without walls." In addition, the current trends in funding public schools and higher education prompt a continual search for more cost-effective delivery systems. Careful selection of available technologies and an appropriate match between media and goals can make distance education the most effective and efficient delivery system for many education programs.

Possibilities and Problems

Distance education presents today's educators with both possibilities and problems. Many educators see dis-

tance education as a promising mechanism for improving access to education by increasing the size of service areas (Jacobsen 1994), by reaching nontraditional learners who cannot afford the time and expense associated with on-campus study (Ehrmann 1990), by enhancing the quality of education through multimedia and interactive instruction (Holloway and Ohler 1991), and by controlling costs by increasing enrollments without additional capital investments (Blumenstyk 1994). Emerging technologies offer the hope of establishing an education system that fosters genuine lifelong learning (Halal and Liebowitz 1994).

But distance education is not without its problems. Distance delivery systems can be expensive to develop and operate (Holloway and Ohler 1991). For example, both instructors and learners need special training and ongoing support to use these new technologies effectively, which demands additional personnel resources (Halpern 1994). In addition, some technologies are not available or not as accessible in some geographic areas as in others, and some are too costly or difficult to use for disadvantaged or special needs learners (Kirkup and Jones 1996).

Educators need to weigh these pros and cons before making a decision to use technology-mediated distance education.

Distance Education Technologies

Many different technologies, alone or in combination, have been used successfully to deliver distance education. Some are relatively "low tech," devices that are familiar to most people and require no special training, such as telephones. Others are "high tech," devices that require practice to master, such as compressed video systems. In addition, some technologies (termed "synchronous") allow learning activities to occur as real-time interactions between instructor and learners; other technologies (termed "asynchronous") enable learners to access instructional materials on demand and instructors to respond when needed.

All of the various technologies present opportunities and constraints that educators must understand. At issue is not which technology is better, but how each technology is best used for specific goals.

Low Tech

Two low-tech devices for distance education are correspondence and audioconferencing.

Correspondence courses, which rely on print materials, still are frequently used for adult education and some college degree programs (Rowntree 1986). The print materials may be supplemented by audiotapes or videotapes of recorded lectures or demonstrations to be viewed in conjunction with reading assignments. Learners typically correspond with the instructor by mail, but they also may use the telephone to obtain individualized guidance or feedback.

Correspondence courses are asynchronous. They place no time or place constraints on the learner, and they are relatively low-cost. However, they provide only limited opportunities for interaction with the instructor and rarely any opportunities for interaction with peers.

Audioconferencing has been used to deliver some distance education (Bates 1995). Audioconference instruction typically uses standard telephone equipment (known as "plain old telephone service," or POTS). Any number of learners and instructors in various locations can interact, though a group of people participating at a single site need to use a speaker phone. Instruction is delivered primarily through lectures and discussions, which may be supplemented with print materials. While some audioconferencing systems include fax machines for print materials, most materials must be distributed by the instructor in advance and reviewed by learners before the conference. Assignments and examinations generally are exchanged by mail.

Audioconferencing is a synchronous delivery system that places no constraint on location, but requires learn-

ers to interact at a scheduled time. Although numerous sites can be connected simultaneously during a telephone conference, in practice it is difficult to manage interactions among many individuals or large groups who cannot see each other. Lack of face-to-face interaction and limitations on the use of visual media are primary drawbacks.

High Tech

Distance education generally uses one or more of four high-tech systems: broadcast television, compressed video, computer multimedia modules, and online instruction.

Broadcast television delivers distance education by sending analog or digital audio and video signals by microwave relay over short distances or by satellite over longer distances (Zigarell 1991). Microwave systems transmit video signals by means of relay towers stationed at 20-mile intervals, which enables them to cover several hundred square miles. Satellite systems, on the other hand, uplink the signal to one of several satellites and then downlink it to multiple sites within a "footprint" that may cover an entire continent.

Television broadcasts transmit a high-resolution signal that can be used for clear and detailed display of one-way video and audio presentations. Televised instruction often is accompanied by audioconferencing to allow interactions between the instructor and learners before, during, or after instruction. This is a synchronous delivery system that restricts learners to properly equipped places and scheduled times.

Although receiving equipment is inexpensive and widely available, the transmission equipment is expensive and requires specially trained production personnel. A fully equipped studio may cost $100,000 or more. Thus the primary drawback to using broadcast television for distance education is the high development and operational costs.

Compressed video systems employ coaxial or fiber optic telephone lines to transmit two-way audio and video signals for distance education (Duran and Sauer 1997). Compressed video is a synchronous delivery system that restricts learners to properly equipped places and scheduled times. It allows instructors and learners to see and hear each other, but the limited bandwidth for transmission and the effects of compression often result in distorted picture and sound quality.

Compressed video transmission requires a system at each site, which can cost $10,000 to $15,000 each. The originating site also must purchase a code device to encode and decode the video and audio signals and must pay fees to the telephone company for use of one or more special digital IDSN (Integrated Digital Services Network) lines.

Computer multimedia modules are a more sophisticated version of the correspondence course (Kommers, Grabinger, and Dunlap 1996). Instructors package instructional materials, including text, audio, and video, on CD-ROM disks. Learners engage in independent study, but they have only limited contact with the instructor and other learners.

A computer with media capabilities and peripherals, such as a disk recorder and duplicator, are required for

developing multimedia materials. The program designer must have considerable expertise in computer programming and the time and energy to produce the modules. And, of course, learners must have access to personal computers with CD-ROM players.

Online instruction uses the Internet and World Wide Web (Kurshan, Harrington, and Milbury 1994). The instructor posts text, audio, and video materials to a site that can be accessed on demand by learners. Sometimes instructors also provide opportunities for interaction through e-mail, listserv discussion groups, or live chat rooms.

Web-based instruction requires knowledge of hypertext markup language (HTML) or a web authoring program. In addition, learners must have access to a computer with either an ethernet connection or a telephone modem and web browser software.

Technology Costs

The use of telecommunications technologies for distance education requires significant funds, both for the purchase and installation of equipment and for support services, maintenance, and repair. Consequently, most education agencies need support from government, foundations, or private corporations to initiate distance education programs. Organizations that have played major roles in funding distance education for two decades include the National Space and Aeronautics Administration, the federal Office of Special Education and Rehabilitative Services, the Corporation for Public Broadcasting, the Annenberg Foundation, and AT&T.

Congress has funded Star Schools Projects since the early 1980s to stimulate the implementation of distance education for elementary and secondary schools. Recognizing the need to control technology costs in order to promote distance education ventures, Congress passed the Telecommunications Act of 1996 to regulate the market, stimulate the development of more cost-effective technologies, and ensure lower rates for education users, such as colleges and universities, schools, and libraries.

Many states have established their own distance education systems. Kentucky and West Virginia have designed both an educational satellite network and a compressed video system linking colleges, schools, and many other public sites across each state. Utah initially developed a microwave television relay system but now is investing heavily in fiber optic connections to permit greater use of online instruction. Oregon created two different satellite networks to reach its remote population and is expanding access to online services as well. Virginia has used its satellite network extensively and even purchased its own transponder, using daytime hours for public school courses and evening and weekend hours for college and university offerings.

Other states, such as Louisiana, have worked out collaborative arrangements to use satellite systems available through the Public Broadcast System to offer coursework through secondary schools and institutions of higher education. Maine has established an interactive television system using fiber optic cable and now is adding Asynchronous Transfer Mode (ATM) tech-

nology, which carries data, video, and audio signals over telephone lines. Alaska has provided funds to promote school system partnerships with local businesses to create local and wide area networks to establish more connections to the Internet for educational uses.

Elementary and Secondary Education

Distance education has been used to enhance public school education at both elementary and secondary levels. Some large-scale applications have been designed by public and private organizations to have national or regional impact, while individual districts, schools, and teachers have developed small-scale applications.

The oldest and simplest application of technology-mediated distance education in the public schools is the use of television broadcasts to facilitate delivery of specialized courses, especially in science, mathematics, and foreign languages. A recent and exciting development is the use of the Internet to involve students from different classrooms in several school districts across state lines or around the world.

Interest currently is growing about the possibility of using compressed video systems to provide consultation with medical and related services specialists to develop and monitor services in the education setting,

such as speech and language therapy, occupational or physical therapy, and sign language instruction.

Large-Scale Applications

The Star Schools Project is a federally funded program that was established in the early 1980s to encourage the use of technology in schools through collaborative partnerships between institutions of higher education, state education agencies, local school systems, and businesses. Since 1988 the University of Oklahoma has operated a Star Schools Project to develop, produce, and offer courses taught by college professors in foreign languages, mathematics, and sciences. These courses are available to schools across the country.

The Missouri State School Boards Association maintains a clearinghouse on information about Star Schools Projects (now known collectively as the Education Satellite Network) and operates a Satlink Internet website to provide school systems with information about technology-mediated courses and professional development activities. The Classroom of the Future Project, sponsored by NASA, recently has been active in developing multimedia instructional modules for use by biology students in several states.

Private foundations and corporations also have been active in funding distance education efforts. The TIE-IN Network is a corporation located in San Antonio, Texas, that contracts with agencies and individuals to offer elementary and secondary programs and staff development to schools in two dozen states. The company has been active for more than a decade.

Channel 1 is a private entity formed in 1990 by Whittle Communications to offer specially designed programming for high school students nationwide, using a news magazine format. Programs are broadcast at designated times during the school day through cooperation with local cable companies and are funded by advertising fees paid by major corporations. AT&T now sponsors Virtual Classroom on the Net, a project that links elementary and secondary schools in the United States with counterparts around the world.

Yahoo, a popular online search engine, provides links to web sites that offer curriculum resources for families engaged in home schooling. The growth of the home schooling movement has prompted one private consulting firm in California to use online audioconferencing to offer tutorial sessions to students across the country.

State education agencies' interest in distance education has led to the development of statewide educational networks, often combining satellite broadcasts, interactive television, and computer networking capabilities. In Virginia, for example, the state satellite system broadcasts content courses in foreign languages, mathematics, and science to schools across the state — sometimes with only one or two learners participating at a given site — with a facilitator at the local school to provide assistance. Hawaii provides access to Advanced Placement courses by using interactive television courses taught by college professors. Indiana has developed a statewide Buddy System to provide computers and modems for families so that students who use the Internet for learning have access to the same equipment at school and home.

Small-Scale Applications

Some school districts have established their own interactive television systems or computer networks to provide more effective education programs. Larger school districts sometimes have the resources to set up their own technology facilities. In the Toledo Public Schools in Ohio, for example, the International Studies Center uses the World Wide Web for video conferences with students in other countries to promote the learning of foreign languages. The Hillsborough County Public Schools in Tampa, Florida, use a compressed video system to help students with special needs who attend an alternative learning center begin the transition to an inclusive high school by initially participating in high school classes at a distance.

Smaller districts typically need to collaborate with other school systems to take advantage of new technologies. School districts in rural northeastern Utah formed a consortium to offer Advanced Placement courses to high school students using television and computers. A group of school districts in North Florida, with support from community businesses, uses interactive television and video field trips in a conflict resolution program for middle school students. Educators in New Mexico use text telephone devices (TTD) to link hearing-impaired students in different schools in order to develop their oral and written language abilities.

Individual educators also have used Internet and web access to implement distance education for specific groups of students. For example, teachers have used

the Florida Information Resource Network (FIRN) to manage collaborative projects in social studies with students in other schools, some in other countries. In Connecticut, special educators have used the Internet to design an electronic penpal program to help students with behavior disorders build social and communication skills.

Postsecondary Education

Many postsecondary institutions use distance education programs. These include undergraduate programs for nontraditional students, especially those in areas without access to campus-based programs, and graduate programs for employees at worksites in such fields as business, nursing, social work, and special education. Professional schools have established national consortia to deliver advanced training in such technical fields as engineering, agriculture, and computer science. A number of major corporations also have made use of televised and online instruction to offer on-the-job training to their employees across the country and, in some cases, around the world. But despite this rapid expansion, postsecondary educators have barely begun to tap the potential of distance education.

Higher Education Applications

All governments are faced with a growing need to make college and university programs more available to nontraditional students, who tend to be older, be em-

ployed, and have family responsibilities. In addition, many rural states face the challenge of extending higher education opportunities to individuals in remote areas. Since 1990 the Annenberg Foundation, in collaboration with the Corporation for Public Broadcasting, has funded the New Pathways to a Degree Initiative to provide financial assistance to colleges and universities using telecommunications to deliver associate, bachelor's, and master's degree programs.

Consortia have been used to allow students at various locations to enroll in programs not available at their own local college or university. The cable network of Jones International (originally known as Mind Extension University, now as Knowledge TV) has used cable television for a decade to offer courses sponsored by a group of 20 affiliated colleges and universities, including the University of Colorado, the University of Maryland, and George Washington University. In 1995 the Western Governors' Association, representing the Western states, announced the establishment of the Virtual University, a cooperative effort with the Western Cooperative for Educational Telecommunications, to offer college courses to students throughout the region. The Southern Regional Education Board (SREB), an association of land-grant and state universities in the Southeast, recently established the Electronic College to facilitate enrollment of students in distance education courses and programs offered by member institutions.

Collaborative arrangements across institutions of higher education often are needed to provide cost-effective distance education. In 1992 the West Virginia

legislature funded a project, titled Bridging the Gap, to make use of the state's satellite broadcast system to offer undergraduate core courses. This took a collective agreement by state colleges and universities to provide telecourses at 90 public libraries around the state. Indiana University-Purdue University at Indianapolis (IUPUI) is using cable television and computer networks to offer an undergraduate degree to minority students, with courses offered through community centers or individual homes. Connected Education, a network of institutions that includes the New School for Social Research and Renssalaer Polytechnic University in New York, offers undergraduate and graduate courses by using computer conferencing.

Some colleges and universities also have implemented distance education programs on their own. Correspondence study at all levels is available through innovative institutions, such as Nova University and Walden University, and more traditional institutions, such as Columbia University and Syracuse University. The University of Maryland's University College uses audiographics to offer computer science courses to students across the state. CyberEd is a series of distance education offerings in undergraduate and graduate programs at the University of Massachusetts at Dartmouth. The University of Arizona's medical school uses the state's interactive television network to offer a graduate degree in public health. In addition, individual faculty members at many universities have made courses available on the World Wide Web; the World Lecture Hall, a web site supported by the University of Texas at

Austin, provides a list and links to many web-based courses.

Collaborations also are growing between elementary and secondary schools and colleges and universities. California State Polytechnic University at Pomona collaborates with local school districts to offer lower-division courses for Advanced Placement credit to students still in high school. (For more information about these types of collaborations, see fastback 438 *Technological Collaborations: K-12 and Higher Education*, by Kay McPherson Ferguson and O.W. Kopp.)

Adult Continuing Education Applications

Distance education also has been used to provide advanced training to practicing professionals. In 1984 several schools of engineering formed the National Technological University (NTU), headquartered in Fort Collins, Colorado, to offer advanced training by satellite to engineers, using experts in specialty areas within each discipline.

The Agricultural Distance Education Consortium (A*DEC), based at the University of Nebraska in Lincoln, is a national alliance of state universities and land-grant institutions that has offered satellite and online training for agricultural extension agents for a number of years and now has extended its mission to include other aspects of economic development. The National University Continuing Education Association (NUCEA), a group of colleges and universities, national corporations, and government agencies, has established an elec-

tronic university to provide satellite courses in health services, business, and engineering to professionals at several hundred industrial sites. The Distance Education and Training Council offers accreditation and linking services for institutions that offer academic, vocational, and leisure courses at the secondary and postsecondary level around the world.

Individual colleges and universities also operate distance education programs for professional certification or staff development. The University of Tennessee at Knoxville, for example, provides training by satellite for annual recertification of law enforcement personnel, who participate in courses using downlink equipment at their own agencies around the state. The Rochester Institute of Technology in New York uses videotaped lectures, audioconferences, and computer connections to offer certification programs in such fields as public health administration and telecommunications network management to professionals across the country and at several international locations. Colorado State University has initiated a doctoral program using compressed video teleconferences supplemented with e-mail and listservs to provide advanced training to administrators in the state's community college system.

Teacher Education

Distance education is used widely for both preservice and inservice teacher education. Technology has made it possible for several institutions to collaborate to deliver highly specialized or low-enrollment preservice training programs to undergraduate students. Some alternative certification programs also use telecommunications for field-based delivery of preservice programs to practicing, but unlicensed, special education personnel. State education agencies have established mechanisms for statewide dissemination of information and creation of teacher support networks by using such online formats as e-mail, listservs, chat rooms, and web pages; and some school systems have facilitated local delivery of inservice training or professional development activities via their own interactive television or computer networks. Most recently, professional organizations are delivering professional development activities nationally through satellite broadcasts and web-based workshops for educators.

Preservice Programs

Distance education is used to support traditional campus-based programs, especially for students en-

gaged in field experiences. At Iowa State University, faculty use the state's interactive television system to observe classrooms during pedagogy courses to help students understand the relationship between theory and practice. In North Carolina, faculty at Appalachian State University have used computer and teleconferencing networks for joint projects by university students and local teachers. The University of Akron relies on videoconferencing to conduct seminars with student teachers while they are off campus. And student teachers at the University of Virginia use computer conferencing to interact with faculty members on campus, as well as with peers who are student teaching in other schools.

Many distance education programs have been directed at training special education personnel in rural areas. The University of New Mexico, for example, uses the Internet to provide basic training for instructional aides and therapy assistants on Indian reservations throughout the state. Utah State University offers a preservice program for prospective special educators in rural areas. The University of Utah has used various technologies, including microwave relay broadcasts and compressed video transmissions, to provide preservice training in special education to educators on Navaho reservations across the state. West Virginia University now uses satellite broadcasts to offer graduate certification and degree programs across the central Appalachian region in the areas of severe or multiple disabilities and early intervention. The University of Central Arkansas, in conjunction with the state education agency, offers a graduate program to assist speech therapists in meeting

requirements for full professional certification while they are employed in local schools.

Inservice Programs

Distance education also is used to provide inservice training and professional development to practicing teachers, particularly in specializations that demand continual updating of skills. Some inservice efforts have had a national distribution using technology-mediated distance education. The TIE-IN Networks offer a large selection of satellite inservice workshops taught by national leaders in different specializations. The Annenberg Foundation has funded a number of distance education efforts using cable or satellite television to offer advanced training in science to secondary teachers. Federal funds were used to develop a special project to provide training on attention deficit disorders to teachers across the country via satellite broadcasts from the University of Georgia. Resources and Instruction for Staff Excellence (RISE) is a private, nonprofit organization that uses multiple technologies to offer professional development, often in collaboration with state agencies, for educators who work with young children.

Several state education agencies also use technology-mediated distance education for inservice training. In 1991 Florida added an electronic mail component to the Florida Information Resource Network to provide all teachers with e-mail accounts in order to facilitate networking among teachers with common interests, as

well as to improve access to the Internet for online instructional resources. The state education agency in Alaska uses computer networking to disseminate curriculum resources to teachers in remote areas for teaching culturally diverse, high-risk students. Faced with the need to disseminate information across an island community, Hawaii's department of education has used satellite broadcasts and interactive television to offer a variety of professional development activities to teachers throughout the state.

Colleges and universities, especially those with a mission to serve the schools, such as land-grant universities, also have used distance education for professional development activities. At Indiana University, faculty use audioconferencing with still-scan graphics to offer inservice training to teachers of at-risk students. Faculty at Southeastern Missouri State University were awarded federal funds to develop multimedia training (on CD-ROM disks) on selecting and designing augmentative and alternative communication devices to distribute to speech therapists and other related services personnel. Special educators themselves have used distance education to improve the skills of regular educators in order to implement inclusionary teaching practices in upstate New York. In Kentucky, assistive technology specialists receive on-the-job training from a distance education program at the University of Kentucky that has made use of both televised classes and online courses. The University of South Carolina provides a toll-free telephone number to give rural special educators access to the Internet in rural school systems that cannot afford online connections.

A few school systems have created their own compressed video systems or wide-area networks for accessing the Internet and World Wide Web and also have used distance education for professional development. The school system in Fort Lauderdale, Florida, uses interactive television to offer inservice training to special education teachers in multiple buildings, thus eliminating the need for the teachers to travel to a central site. Other Florida systems use e-mail for peer mentoring and support for new teachers, as well as for disseminating innovative teaching strategies.

To date, professional organizations have been slow to become involved in distance education efforts, but they can be expected to make wider use of new technologies to reach their members and other educators in the future. Phi Delta Kappa International has used satellite broadcasts to host interactive teleconferences on critical issues in education and to connect educators across North America. The National Education Association produced a series of videotapes known as Teacher TV to disseminate possible solutions to common classroom problems, such as cross-age tutoring and alternative assessments. The National Association for the Education of Young Children has begun to sponsor a series of teleconferences on developmentally appropriate practice for early childhood educators. Recently, the Council for Exceptional Children, the largest group of special educators and related services personnel in the world, instituted a series of satellite teleconferences for continuing education on current federal legislation affecting special education, as well as web-based training

for teachers. And, of course, most professional organizations maintain a web site containing information about the organization and other topics of interest to educators.

(For more information about distance learning and teacher education, also see fastback 440 *Distance Education and Teacher Education at Armstrong Atlantic State University* by Maryellen S. Cosgrove.)

Implications and Suggestions

Distance education offers hope for solving some of the most pressing problems in education. It can provide elementary and secondary students with access to expert teachers in all content areas, whether the students live in remote rural areas or inner-city environments. It can enable college students to study specialized disciplines through cross-campus distance education agreements. And it can provide accessible, effective preservice and inservice programs. But distance education also presents new problems for educators to solve.

Surprisingly little research has been done to evaluate the outcomes of distance education. Some data suggest that most mechanisms for technology-mediated instruction are as effective as traditional face-to-face instruction (Kozma 1991). Studies also show that while most learners state a clear preference for face-to-face instruction and interpersonal contacts, they generally express satisfaction with distance education because of its greater accessibility (McNabb 1994; Wagner 1993).

Other studies suggest that the most critical feature is learner support through structured instruction, sup-

plemental print materials, and frequent interactions (Dillon 1992; Valcke 1993). Many instructors report that younger learners are less intimidated by technology but may need more assistance in maintaining attention and motivation. On the other hand, they find that more mature learners, initially fearful of technology, are sufficiently experienced to direct their own learning successfully and are highly committed to participating in interactions.

There is some evidence that the relative anonymity and greater time for reflection of asynchronous delivery systems actually may improve participation and increase critical thinking (Burton 1994; Stork and Sproull 1995). On the other hand, the physical and psychological distance created by technology has been shown to decrease the positive affect associated with the learning of content-related values (Culnan and Markus 1987). Some education theorists argue that the type of media used for instruction does not influence learning (Clark 1994), while others assert that media influence not only what people learn but how they learn (Salomon 1997).

Many educators believe that simplistic comparisons between technologies or between traditional and distance delivery are meaningless (Kozma 1994). The Flashlight Project, founded by Annenberg and now operated by the American Association for Higher Education, is developing evaluation tools designed to assist educators in determining the effectiveness, impact, and cost-efficiency of technology-based distance education programs. Future research will need to focus on identifying which educational goals can be accom-

plished best via distance education, as well as which technologies are most efficient in accomplishing specific educational outcomes.

The Pace of Change

Educators at all levels have been relatively slow to embrace technology in general and technology-mediated distance education in particular. The pace of change is affected by several issues. Distance education is a costly enterprise; equipment and facilities are expensive to obtain and to maintain. Most technologies continue to be plagued by transmission problems that periodically interrupt instruction and frustrate teachers and learners alike (Healy 1997). And few instructors have had access to the training, support services, or financial resources needed to use telecommunications technologies effectively for instruction (Geoghegan 1994).

Some educators have expressed concern about intellectual property rights when courses are recorded on videotape or posted on the web (Salomon and Pierce 1997). Others have worried about how copyright protections might restrict access to or increase costs of electronic distribution of valuable learning materials (Botterbusch 1996). Administrators have noted issues related to accreditation of degree programs (Bruder 1989) and the assignment of faculty (Gilbert and Green 1997). In states with collective bargaining provisions for educators, unions representing teachers and faculty members have blocked or slowed efforts to establish distance education programs (Blumenstyk 1994).

However, educators are realizing the promise that distance education holds. It seems likely that distance education will effect major changes in the way schools do business. Every school will have access to previously unimagined instructional expertise and resources. All schools soon will be using telecommunications to establish ad hoc communities of interest to students and teachers and to explore global relations with schools around the world. Rural schools and inner-city schools, in particular, will benefit from the greater access to resources that emerging technologies will provide.

To take full advantage of distance education in the schools, district and building administrators will need to learn how to manage technology resources, and teachers and specialists will need to acquire skills for using new technologies to enhance learning.

Higher education also will undergo significant changes as a result of distance education. Distance education can be used by institutions of higher education to extend program offerings by providing access to technology-mediated delivery at other locations. Some colleges and universities will use distance education to build programs that usually have low enrollments by attracting students from a wider area.

As institutions compete for critical tuition dollars, they will be able to attract students with distance education aimed at regional, national, and even international populations. Students in the future also may be able to choose degree programs based on such considerations as convenience (as in web-based courses accessed from home), cost (less expensive regional institutions versus pricey private local institutions), and prestige (graduate

training from a leading business school instead of a state university) — all affected by the availability of distance education.

These future scenarios argue the need for educators and policy makers at all levels to develop plans for building institutional technology infrastructures and for teachers, whether K-12 or higher education, to acquire knowledge and skills in designing and managing technology-mediated instruction for a broad range of learners.

Suggestions for Educators

Administrators at all levels must understand the implications of technology-mediated distance education and provide support for the individuals who must implement programs. Administrators need:

- Access to current and detailed information about the various technologies available and their appropriate uses in educational applications, including updates on new developments in various technologies and examples of effective educational uses of technologies by similar agencies;
- Guidelines on how to purchase, lease, or contract for technologies used to deliver distance education;
- Training in hiring, retooling, or training staff to develop and implement effective distance education programs; and
- Strategies for sharing responsibilities and costs associated with employing and supervising personnel in collaborative distance education programs.

Instructors, whether they are public school teachers or college and university faculty, must be aware of the potential applications of distance education and effective strategies for presenting content and promoting active learning at a distance. Instructors need:

- Training to develop skills in using telecommunications technologies for a variety of instructional activities;
- Opportunities to engage in cooperative activities to develop, produce, and deliver technology-based distance education;
- Strategies for making the technology transparent so that the learner can focus on the instruction; and
- Motivation to adapt their instructional styles to take advantage of specific technologies, for example, substituting print materials for lectures, employing more individual and group activities, creating assignments that require exploring resource databases, and using cooperative learning.

Teacher educators and those who prepare administrative and leadership personnel also must understand the implications of distance education. They need to:

- Identify the new roles and competencies needed by educators at all levels to implement technology-mediated distance education;
- Design preservice and inservice programs to prepare educators for those roles and responsibilities; and
- Collaborate with technical and support personnel in preparing instructional materials and using technologies to deliver instruction.

Finally, education researchers must study the outcomes and costs associated with technology-based distance education and provide policy makers with useful data. Researchers need to:

- Choose research designs to investigate which technologies are most effective in teaching specific knowledge or skills to learners;
- Identify and measure development and operational costs associated with various technologies to assess cost efficiency;
- Implement quantitative and qualitative investigations to identify process and product variables, as well as intended and unintended effects of distance education programs; and
- Design cross-sectional and longitudinal evaluations to examine the effect of distance education and its potential as a solution to some of the critical problems in education.

Using Distance Education Effectively

The effective use of technology-mediated distance education requires that education goals drive the technology. Most technologies can accommodate a range of learning outcomes and activities, but they will change the role of teacher from expert to resource (Wagner 1996). Instructors using technology-mediated distance education will need to enhance the interpersonal aspects of instruction while minimizing the technical aspects, thereby achieving the balance between "high-tech" and "high-touch" that Naisbitt called for in his

book, *Megatrends*. In addition, the convergence of technologies through digital formats means that instructors will need to know how to combine technologies to design dynamic delivery systems (Van Horn 1998*b*).

Examples of "bad" distance education abound: televised courses that feature only the instructor as a boring "talking head," web-based training with long pages of text that are difficult to read on screen, two-way compressed video with no interactions with distant learners. The faults of traditional instruction, such as lectures, can be multiplied by some distance education technologies. And many educators do not yet have the skills needed to create and produce media, to operate and troubleshoot complex equipment, or to teach effectively with technology.

"Good" distance education programs, however, are not only possible but imperative. Collaboration between content experts and production specialists results in technology-mediated instruction that offers appropriate learning experiences and high production values.

So-called live technologies that deliver instruction in real time (audioconferences, television broadcasts, compressed video transmission) demand instruction that is spontaneous and immediate. And on-demand technologies that allow learners access to instruction at their own time and pace (correspondence courses, computer-managed multimedia modules, web-based training) call for instruction that allows the learner to make choices.

Finally, all distance education technologies require many opportunities for learners to interact with the instructor and peers through surface mail, telephone, and

electronic forums such as e-mail, listserv discussion groups, and chat rooms.

Tomorrow's Schools

Distance education has the power to revolutionize education in tomorrow's schools. Technology-mediated distance education creates a vision of schools and universities without walls, freeing learners of all ages from the constraints of time and place and allŏŵing them to learn what they want when they want. Burrus (1993) contends that the necessary technologies already are available, but the challenge is to encourage people to make more effective use of them. And Yates (1995) argues that the most critical goal of education in the next century will be to teach learners how to use technology wisely to solve local and global problems. If society is to realize these visions, educators must learn how to balance equity and excellence by using distance education technologies to enhance access to educational programs and yet ensure quality learning experiences.

Two developments in telecommunications technology hold promise for distance education in the future. Scientists are already at work on Internet2, which will provide the high bandwidth needed for real-time, high-speed transmission of video, audio, and data (Van Horn 1998*a*). This development will facilitate the use of desk-

top videoconferencing and allow immediate online access to audio and video files without downloading them to the desktop.

Second, industry leaders have announced plans to launch a series of low earth-orbit satellites that will allow video, audio, and data to be transmitted around the world on devices similar to cellular telephones (Cook 1997). This development not only will significantly increase bandwidth capacity, but also establish genuinely global connections.

If, or when, these advances become reality, the delivery system will exist to accommodate interactions in real time between any instructor using any medium with any learner in any location throughout the world. Such technologies make possible links between learners and libraries, archives, experts, collaborative learning groups, and special interest discussion groups that will create possibilities for education never before imagined. Educators will come to use these technologies to conduct online personal conferences, to view classrooms for the purpose of preservice instruction, to facilitate peer teacher mentoring and coaching, to participate in cross-cultural discussions of global education issues, and to access resources from a worldwide information network.

The growing presence of distance education at all levels of the education enterprise will result in many important changes. Researchers investigating the role of various telecommunications technologies in promoting acquisition of new knowledge and skills at a distance will offer new insights into the teaching-learning

process. Information about the effective use of technology-mediated distance education will lead to modifications in the roles of personnel and the programs that prepare them to work in public schools and institutions of higher education. And, of course, the high initial costs associated with distance education delivery will promote greater collaboration to design and deliver education programs that integrate expertise in subject matter content, instructional design, and production techniques. Technology-mediated distance education represents a vast social experiment; consequently, educators must assume a leadership role in determining how today's technologies will shape tomorrow's schools.

References

Bates, A.W. *Technology, Open Learning, and Distance Education*. New York: Routledge, 1995.

Blumenstyk, G. "Networks to the Rescue? Using Telecommunications Networks to Serve More Students Without the Costs of Building a New Campus." *Chronicle of Higher Education*, 14 December 1994, pp. A21-A22.

Botterbusch, H.R. *Copyright in the Age of New Technology*. Fastback 405. Bloomington, Ind.: Phi Delta Kappa Educational Foundation, 1996.

Bruder, I. "Distance Learning: What's Holding Back This Boundless Delivery System?" *Electronic Learning* 9 (April 1989): 30-35.

Burrus, D. *Technotrends: How to Use Technology to Go Beyond Your Competition*. New York: Harper Business, 1993.

Burton, C. "Using the Internet for Teaching, Learning, and Research." In *Changing College Classrooms: New Teaching and Learning Strategies for an Increasingly Complex World*, edited by D.F. Halpern et al. San Francisco: Jossey-Bass, 1994.

Clark, R.E. "Media Will Never Influence Learning." *Technology Research and Development* 42 (Summer 1994): 21-29.

Cook, W.J. "1997: A New Space Odyssey." *U.S. News and World Report*, 3 March 1997, pp. 55-52.

Culnan, M. J., and Markus, M. L. "Information Technologies." In *Handbook of Organizational Communication*, edited by F.M. Jablin, L.L. Putnam, K.H. Roberts, and L.W. Porter. Newbury Park, Calif.: Sage, 1987.

Dillon, C.L. "Learner Support: The Critical Link in Distance Education." *Distance Education* 13, no. 1 (1992): 29-45.

Duran, J., and Sauer, C. *Mainstream Videoconferencing: A Developer's Guide to Distance Multimedia*. Reading, Mass.: Addison-Wesley, 1997.

Ehrmann, S.C. "Reaching Students, Reaching Resources: Using Technologies to Open the College." *Academic Computing* 4 (April 1990): 10-14, 32-34.

Geoghegan, W. "Stuck at the Barricades: Can Information Technologies Really Enter the Mainstream of Teaching and Learning?" *American Association for Higher Education Bulletin* 47 (September 1994): 13-16.

Gilbert, S.W., and Green, K.C. "Moving Information Technology into the Classroom." In *The Foundations of American Distance Education*, edited by L.K. Enghagen. Washington, D.C.: National Education Association, 1997.

Halal, W.E., and Liebowitz, J. "Telelearning: The Multimedia Revolution." *The Futurist* 28 (November-December 1994): 21-26.

Halpern, D.F. "Rethinking College Instruction in a Changing World." In *Changing College Classrooms: New Teaching and Learning Strategies for an Increasingly Complex World*, edited by D.F. Halpern et al. San Francisco: Jossey-Bass, 1994.

Healy, E.P. "Creating Accessible Education Through Technology: The Maine Experience." In *The Foundations of American Distance Education*, edited by L.K. Enghagen. Washington, D.C.: National Education Association, 1997.

Holloway, R.E., and Ohler, J. "Distance Education in the Next Decade." In *Instructional Technology: Past, Present, and Fu-*

ture, edited by G.J. Anglin. Englewood, Colo.: Libraries Unlimited, 1991.

Holmberg, B. *Theory and Practice of Distance Education*. 2nd ed. New York: Routledge, 1995.

Jacobson, R.L. "Extending the Reach of 'Virtual' Classrooms." *Chronicle of Higher Education*, 6 July 1994, pp. A19-A21.

Keegan, D. "On Defining Distance Education." In *Distance Education: International Perspectives*, edited by D. Sewart, D. Keegan, and B. Holmberg. New York: Routledge, 1988.

Kirkup, G., and Jones, A. "New Technologies for Open Learning: The Superhighway to the Learning Society?" In *The Learning Society: Challenges and Trends*, edited by P. Raggett, R. Edwards, and N. Small. New York: Routledge, 1996.

Kommers, P.A.M.; Grabinger, S.; and Dunlap, J.C., eds. *Hypermedia Learning Environments: Instructional Design and Integration*. Mahwah, N.J.: Lawrence Erlbaum Associates, 1996.

Kozma, R.B. "Learning with Media." *Review of Educational Research* 61, no. 2 (1991): 172-211.

Kozma, R.B. "Will Media Influence Learning? Reframing the Debate." *Technology Research and Development* 42 (Summer 1994): 7-19.

Kurshan, B.L.; Harrington, M.A.W.; and Milbury, P.G. *An Educator's Guide to Electronic Networking: Creating Virtual Communities*. Syracuse, N.Y.: Syracuse University Press, 1994.

McNabb, J. "Telecourse Effectiveness: Findings in the Current Literature." *Tech Trends* 39, no. 5 (1994): 9-40.

Moore, M.G. "International Aspects of Independent Study." In *The Foundations of American Distance Education*, edited by B.L. Watkins and S.J. Wright. Dubuque, Iowa: Kendall Hunt, 1991.

Moore, M.G., and Kearsley, G. *Distance Education: A Systems View*. Belmont, Calif.: Wadsworth, 1996.

Naisbitt, J. *Megatrends: Ten New Directions Transforming Our Lives*. New York: Warner, 1982.

Nipper, S. "Third Generation Distance Learning and Computer Conferencing." In *Mindweave: Communication, Computers, and Distance Education*, edited by R. Mason and A. Kaye. New York: Pergamon, 1989.

Perraton, H., ed. *Distance Education for Teacher Training*. New York: Routledge, 1993.

Rowntree, D. *The Planning and Management of Distance Education*. London: Croom Helm, 1986.

Salomon, G. "Of Mind and Media: How Culture's Symbolic Forms Affect Learning and Thinking." *Phi Delta Kappan* 78 (January 1997): 375-80.

Salomon, K., and Pierce, M. "Copyright Law and the Information Superhighway." In *The Foundations of American Distance Education*, edited by L.K. Enghagen. Washington, D.C.: National Education Association, 1997.

Stork, J., and Sproull, L. "Through a Glass Darkly: What Do People Learn in Videoconferences?" *Human Communication Research* 22, no. 2 (1995): 197-219.

Tiffin, J., and Rajasingham, L. *In Search of the Virtual Class: Education in an Information Society*. New York: Routledge, 1995.

Valcke, M.M.A. "The Actual Use of Embedded Support Devices in Self-Study Materials by Students." *Distance Education* 14, no. 1 (1993): 55-84.

Van Horn, R. "Internet2 and InternetE." *Phi Delta Kappan* 79 (January 1998): 413-14. a

Van Horn, R. "Visions: Enabling Technology for Programs of Distinction." *Phi Delta Kappan* 79 (February 1998): 477-78. b

Verduin, J.R., and Clark, T.A. *Distance Education: The Foundations of Effective Practice*. San Francisco: Jossey-Bass, 1991.

Wagner, E.D. "Variables Affecting Distance Education Success." *Educational Technology* 33, no. 4 (1993): 28-32.

Wagner, N. "Telecommunications and the Changing Nature of Instructional Delivery." *Syllabus* 9 (June 1996): 10-12.

Yates, B. "The Individual and the Group as Technology-Based Problem Solvers." In *Interactive Learning in the Higher Education Classroom*, edited by H.C. Foyle. Washington, D.C.: National Education Association, 1995.

Zigarell, J. *The Uses of Television in American Higher Education*. New York: Praeger, 1991.

Resources

Books

Alber, A.F. *Multimedia: A Management Perspective*. Belmont, Calif.: Wadsworth, 1996.

Bates, A.W. *Technology, Open Learning, and Distance Education*. New York: Routledge, 1995.

Corporation for Public Broadcasting. *Pathways to Success: Using Technologies to Reach Distant Learners*. Washington, D.C., 1991.

Corporation for Public Broadcasting. *Going the Distance: A Handbook for Developing Distance Degree Programs*. Washington, D.C., 1992.

Corporation for Public Broadcasting. *Teaching Telecourses: Opportunities and Options*. Washington, D.C., 1993.

Cyrs, T.E., ed. *Teaching and Learning at a Distance: What It Takes to Effectively Design, Deliver, and Evaluate Programs*. San Francisco: Jossey-Bass, 1997.

Duran, J., and Sauer, C. *Mainstream Videoconferencing: A Developer's Guide to Distance Multimedia*. Reading, Mass.: Addison-Wesley, 1997.

Ellsworth, J. *Education on the Internet*.. Indianapolis: Sams, 1994.

Enghagen, L.K., ed. *Technology and Higher Education*. Washington, D.C.: National Education Association, 1997.

Fidler, R. *Mediamorphosis: Understanding the New Media*. Thousand Oaks, Calif.: Sage, 1997.

Holmberg, B. *Theory and Practice of Distance Education*. 2nd ed. New York: Routledge, 1990.

Keegan, D. *Foundations of Distance Education*. 3rd ed. New York: Routledge, 1996.

Kommers, P.A.M.; Grabinger, S.; and Dunlap, J.C., eds. *Hypermedia Learning Environments: Instructional Design and Integration*. Mahwah, N.J.: Lawrence Erlbaum Associates, 1996.

Kurshan, B.L.; Harrington, M.A.W.; and Milbury, P.G. *An Educator's Guide to Electronic Networking: Creating Virtual Communities*. Syracuse, N.Y.: Syracuse University, ERIC Clearinghouse on Information and Technology, 1994.

Laurillard, D. *Rethinking University Teaching: A Framework for the Effective Use of Educational Technology*. New York: Routledge, 1993.

Lochte, R.H. *Interactive Television and Instruction: A Guide to Technology, Technique, Facilities Design, and Classroom Management*. Englewood Cliffs, N.J.: Educational Technology Publications, 1993.

Moore, M.G., and Kearsley, G. *Distance Education: A Systems View*. Belmont, Calif.: Wadsworth, 1996.

Olsen, G. *Getting Started in Multimedia Design*. Cincinnati: North Light, 1997.

Rowntree, D. *The Planning and Management of Distance Education*. London: Croom Helm, 1986.

Tiffin, J., and Rajasingham, L. *In Search of the Virtual Class: Education in an Information Society*. New York: Routledge, 1995.

Verduin, J.R., and Clark, T.A. *Distance Education: The Foundations of Effective Practice*. San Francisco: Jossey-Bass, 1991.

Wetzel, C.D.; Radtke, P.H.; and Stern, H.W. *Instructional Effectiveness of Video Media*. Hillsdale, N.J.: Lawrence Erlbaum Associates, 1994.

Willis, B. *Distance Education: A Practical Guide*. Englewood Cliffs, N.J.: Educational Technology Publications, 1993.

Zigarell, J. *The Uses of Television in American Higher Education*. New York: Praeger, 1991 .

Periodicals

American Journal of Distance Education, published quarterly by the American Center for the Study of Distance Education, Pennsylvania State University, 110 Rackley Building, University Park, PA 16802-3202. (814) 863-3764; acsde@psu.edu; http://www.cde.psu.edu/acsde

International Journal of Educational Telecommunications, published quarterly by the Association for the Advancement of Computing in Education, P.O. Box 2966, Charlottesville, VA 22902. (804) 973-3987; aace@virginia.edu; http://www.aace.org

Journal of Technology and Teacher Education, published quarterly by the Association for the Advancement of Computing in Education, P.O. Box 2966, Charlottesville, VA 22902. (804) 973-3987; aace@virginia.edu; http://www.aace.org

Learning and Leading with Technology, published eight times per year by the International Society for Technology in Education (ISTE), 1787 Agate Street, Eugene, OR 97403-1923. iste@oregon.uoregon.edu; http://iste.org

Technological Horizons in Education (T.H.E.) Journal, published monthly except July by T.H.E. Journal, 150 El Camino Real, Suite 112, Tustin, CA 92680-3670. (714) 7304011; http://www.thejournal.com

Tech Trends, published six times per year by the Association for Educational Telecommunications and Technology (AECT), 1025 Vermont Avenue, N.W., Suite 820, Washington, DC 20005. (202) 347-7834; aect@aect.org; http://www.aect.org

Organizations

American Center for the Study of Distance Education (ACSDE), College of Education, Pennsylvania State University, 110 Rackley Building, University Park, PA 16802-3202. (814) 863-3764; acsde@psu.edu; http://www.cde.psu.edu/acsde

Annenberg/Corporation for Public Broadcasting Project (Annenberg/CPB), 901 E Street N.W., Washington, DC 20004-0006. (202) 879-9600; info@learner.org; http://www.learner.org

Association for the Advancement of Computing in Education, P.O. Box 2966, Charlottesville, VA 22902. (804) 973-3987; aace@virginia.edu; http://www.aace.org

Association for Educational Communications and Technology (AECT), 1025 Vermont Avenue, NW, Suite 820, Washington, DC 20005. (202) 347-7834; http://www.aect.org

Distance Education and Training Council, 1601 18th Street NW, Washington, DC 20009-2529. (202) 234-5100; detc@detc.org; http://www.detc.org

International Society for Technology in Education (ISTE), 1787 Agate Street, Eugene, OR 97403-1923. iste@oregon.uoregon.edu; http://iste.org

International Teleconferencing Association (ITCA), 100 Four Falls Corporate Center, Suite 105, West Conshohocken, PA 19428. (610) 941-2020; staff@itca.org; http://www.itca.org

National University Continuing Education Association (NUCEA), One Dupont Circle NW, Suite 615, Washington, DC 20036-1168. (202) 659-3130; postmaster@nucea.edu; http://nucea.edu

Star Schools Clearinghouse on Planning and Implementation of Distance Learning Systems, Missouri School Boards Association, 2100 I-D Drive SW, Columbia, MO 65203. (314) 445-9920; vieth@msba.gen.mo.us; http://www.msba.gen.mo.us

World Lecture Hall of Online University Courses. University of Texas at Austin. http://www.utexas.edu/world/lecture

Phi Delta Kappa Educational Foundation

The Phi Delta Kappa Educational Foundation was established on 13 October 1966 with the signing, by Dr. George H. Reavis, of the irrevocable trust agreement creating the Phi Delta Kappa Educational Foundation Trust.

George H. Reavis (1883-1970) entered the education profession after graduating from Warrensburg Missouri State Teachers College in 1906 and the University of Missouri in 1911. He went on to earn an M.A. and a Ph.D. at Columbia University. Dr. Reavis served as Assistant Superintendent of Schools in Maryland and Dean of the College of Arts and Sciences and the School of Education at the University of Pittsburgh. In 1929 he was appointed director of instruction for the Ohio State Department of Education. But it was as assistant superintendent for curriculum and instruction in the Cincinnati public schools (1939-48) that he rose to national prominence.

Dr. Reavis' dream for the Educational Foundation was to make it possible for educators to write and publish the wisdom they acquired through professional activity. He wanted educators and the general public to "better understand the nature of the educative process and the relation of education to human welfare."

The Phi Delta Kappa fastbacks, along with monographs and books on a wide range of topics related to education, are the realization of that dream.

Phi Delta Kappa Fastbacks

This annual series, published each fall and spring, offers fastbacks on a wide range of topics in education. Each fastback is intended to be a focused, authoritative treatment of a topic of current interest to educators and other readers. More than 400 fastbacks have been published since the program began in 1972, many of which are still in print. Topics include:

Administration
Adult Education
The Arts
At-Risk Students
Careers
Censorship
Community Involvement
Computers
Curriculum
Decision Making
Dropout Prevention
Foreign Study
Gifted and Talented
Legal Issues
Mainstreaming
Multiculturalism
Nutrition
Parent Involvement
School Choice
School Safety
Special Education
Staff Development
Teacher Training
Teaching Methods
Urban Education
Values
Vocational Education
Writing

For a current list of available fastbacks and other publications, please contact Phi Delta Kappa International, 408 North Union, P.O. Box 789, Bloomington, IN 47402-0789, or (812) 339-1156.

ISBN 0-87367-639-4

58